Damage and Recovery From the 2014 Polar Vortex

National Nuclear Security Administration Tritium Facilities at the Savannah River Site

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Conditions: Between January 6 and January 8 the Savannah River Site experienced 40 consecutive hours of sub-freezing temperatures.

- low temperature of 12°F
- 12 consecutive hours below 20°F

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H-Area Old Manufacturing Facility – 61,000 sqft uninsulated
Transite

- Shipping, receiving, and other activities to support military customers

Tritium Facility Fire Protection System

- Safety Significant Wet Pipe System with Small Dry Pipe Zone
- Smoke detection (PS)
- Composed of 12 Zones including 2 smaller ancillary facilities
- Dedicated fire water supply from H-Area

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Site's 50+ year old coaled fired steam generation facility was replaced in 2012 with a Biomass Cogeneration Facility

- 20 MW and 120,000 pounds/hour steam
- Burns wood chips and tires
- Sole provider of site steam

Many Tritium Facilities rely on site steam for heat

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During the late night hours of January 6 the Biomass facility experienced freezing sensing lines on critical instrumentation that tripped both boilers off line. The Plant was unable to restore steam quickly and the steam header was closed around 0230 hours on January 7.

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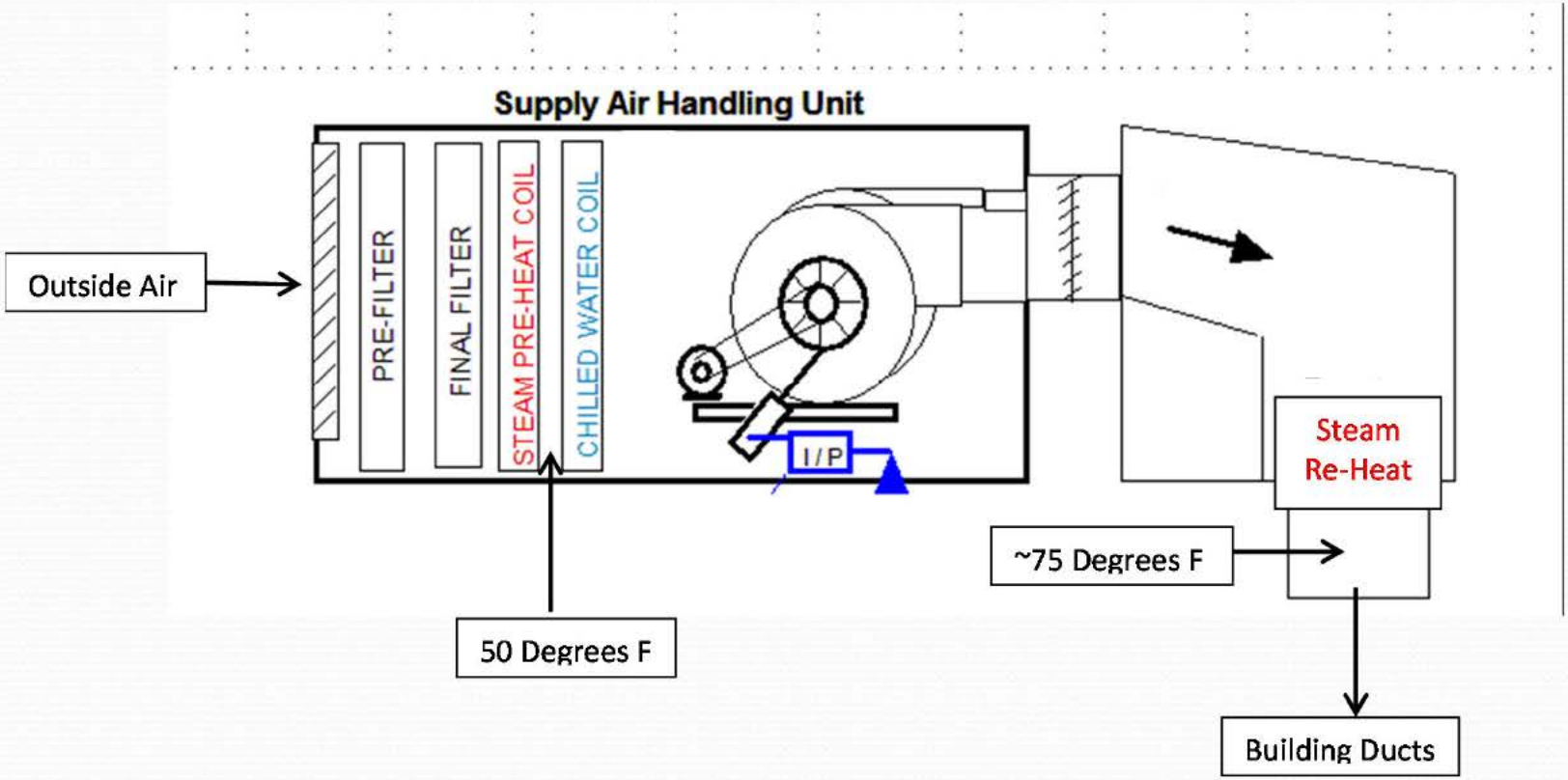

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Steam was lost during the beginning of a period of 40 hours below freezing.

The loss of site steam was unexpected and unprecedented

- Tritium had no AOPs or ARPs for loss of steam and no established control room indications
- Existing procedures/rounds did not provide for timely response or mitigative actions
- Communications from the site did not convey the extent of issues at the Biomass Facility

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Concern for wet pipe systems and cooling coils in multiple nuclear facilities during backshift hours.

Temperatures were monitored in process facilities and actions were taken to drain the fire suppression systems and enter LCOs.

Steps were taken to drain AHU cooling coils but damage was already sustained.

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Wet Pipe Suppression System damaged in H-Area Old Manufacturing Facility

All Cooling Coils in both H-Area Old Manufacturing Facility Air Handling Units were damaged beyond repair (14 sets of coils total)

2 of 4 sets of coils damaged beyond repair in H-Area New Manufacturing Facility

Loss of building humidity control which is needed for mission related activities

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Wet Pipe Suppression System Damage

Two 1" drops fell from ceiling

Three Tees Broken

Two Elbows Broken

Leaking joints

92 Sprinkler Heads Replaced

Integrity of entire system called into question – extent of damage unknown

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Extent of Damage Determination

100 % visual inspection

Zone specific pneumatic testing

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Due to the length of the damage assessment and repair duration, a Response Plan was required.

After a brief period in Standby, the facility implemented a Response Plan on February 18 for lack of operable fire suppression system in HAOM.

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The response plan prohibited certain operational activities but would allow others with certain additional controls implemented:

Prohibited:

- Huts except to protect equipment
- Certain Vehicular Traffic
- Appliances
- Cooking

All hot work approved by FM

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Required Actions:

- Fire Patrol every 4 hours
- Verify functionality of Fire Alarm Control Panels daily
- Establish Fire Watch for higher hazard activities

The goal of the response plan was to reduce fire risk by limiting activities, combustibles, ignition sources, and enhancing fire detection

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Fire system repairs were completed in late March

PMT

- In service leak testing
- 2 hour hydrostatic test was completed for Zone 9
- Surveillance Requirements performed on system

System returned to service April 3rd and Response Plan exited

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Lessons Learned and Opportunities for Improvement

- Do not be lulled into a false sense of security
- Review procedures for loss of supporting infrastructure
- Review readiness to take mitigative actions to protect equipment/systems
- Ensure cold weather preps are comprehensive
- Evaluate the adequacy of alarms and indications

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Equipment Enhancements Planned

- Install freeze stats on AHUs without them
  - When Temp downstream of Pre-heater reaches 37 degrees – coils go to full flow
  - Interlock to shutdown supply fans
  - Provide Control Room indication of condition
- Develop procedures for new controls and actions
- Establish PMs for freeze stats
- Provide Training and perform drills

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Questions?